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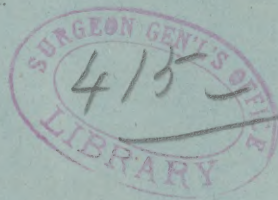
PROGNOSIS
IN
PULMONARY TUBERCULOSIS,

*BASED UPON AN ANALYSIS OF FIVE HUNDRED
AND FIFTEEN CASES.*

BY

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ASSOCIATION, ETC.



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PROGNOSIS IN PULMONARY TUBERCULOSIS,

Based upon an Analysis of Five Hundred and Fifteen Cases.¹

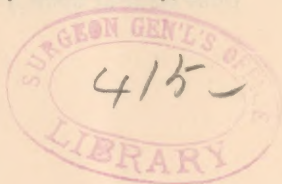
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If I should state that of 515 cases of pulmonary tuberculosis 59 recovered and 65 showed material and lasting improvement, and that the percentage of recoveries was eleven and a fraction, such statement would aid but little in the prognosis of a given case, and also would be unreliable as to the necessary mortality of cases, unless all of them came under treatment and observation at the same stage of the disease and remained under the same conditions until the outcome was determined. Should I endeavor to base a prognosis upon the first 181 cases of my series, in which there were but 3 recoveries, I might well doubt my diagnoses, and take it for granted that in these 3 cases my senses deceived me, and that the disease was always fatal.

Statistics based upon the diagnosis of tuberculosis previously to 1883, or upon cases in which bacilli were not invariably demonstrated, would, in all prob-

¹ Read before the Buncombe County Medical Society, Asheville, N. C., July 7, 1890.



ability, include some cases of non-bacillary disease. My deductions are based upon cases in which the microscopical diagnosis was clear, which have been under my own observation, and of which I have not only the histories and records while under my care, but have also been able to ascertain the course of the disease up to the date of my inquiry, by direct and indirect communications with patients and their friends, or their physicians. I take this opportunity to express my thanks to the physicians to whom I frequently appealed for careful replies, without which the number of cases available for classification would be much smaller. I hope that the vast amount of labor involved in correspondence and detailed inquiries may be justified by a more ready appreciation of the various points which bear upon prognosis directly or indirectly, and perhaps by the adoption of means, or avoidance of influences, which appear to affect the course of the disease.

It may be well to explain here my meaning when speaking of *improved* or *recovered* cases. Under the former I include all patients in whom general and local improvement lasted for a number of months, the temperature, as a rule, not exceeding 100° F.; who gained in flesh and strength and were able to resume their vocations; in whom cough and expectoration were materially diminished, but still present at the time of their discharge, and who, as far as ascertainable, still show tubercle bacilli in the sputum. (In some of these cases sputum examinations have not been made for several years; some sent me specimens by mail; others had examinations made at home.)

As *recovered* cases, I report those in which all local and general symptoms have disappeared, no active symptoms having been present for six months or more; cough and expectoration having nearly or quite ceased, with continued absence of bacilli in the sputum, if slight expectoration still exist. A number of the improved cases could have been included among the recovered were it not for the bacilli which still appear in the slight expectoration.

The following table shows the influence of age and the general mortality of my cases. Among the fatal cases I have also included patients who are still alive, but who are growing worse, and in whom the termination will probably be fatal:

Age.	Total number of cases.	Number that have died or are growing worse.	Per cent.	Improved and are still doing well.	Per cent.	Recovered.	Per cent.
5 to 15	5	5	100	0		0	
15 " 20	24	22	91.6	1	4.2	1	4.2
20 " 30	186	153	82.2	16	8.6	17	10.5
30 " 40	216	152	70.4	39	18.0	25	12.0 ¹
40 " 50	67	46	68.6	7	10.4	14	20.8
50 " 60	16	12	75.0	2	12.5	2	12.5 ¹
60 " 70	1	1	100	0		0	
Total,	515	391	76	65	12.5	59	11.5

The influence of age.—Of the 391 cases who died or have become hopelessly advanced in the disease, there are 223, or 57 per cent., who, at one time,

¹ One of the recovered cases that died of other disease.

while under my care, showed somewhat encouraging improvement; 67 of these to such an extent that permanent arrest seemed probable. In these 67 cases (38 per cent.) the relapses were, with few exceptions, due to preventable causes—as a rule, to the too early abandonment of climatic and general treatment, obstinately continued over-exertion, or to imprudent exposures. In 8 cases the relapse was clearly referable to epidemic influenza. The latter disease also caused serious relapses in several cases in which the disease was nearly arrested. Four cases that I had considered as cured I have excluded from my report of recovered cases, as I am unable to determine the exact nature of the lung disease which accompanied the influenza, and which continued until death, the patient not being under my care at the time, and microscopical examinations of the sputum not having been made by the attending physicians.

The apparent influence of age upon prognosis is shown by the table to be favorable in proportion to the number of years up to fifty, after which the effects of advancing age seem to influence the prognosis somewhat adversely. The number below twenty years and above fifty is, however, so small that no conclusions are really justifiable.

The influence of sex.—Of the 515 cases, 290 were males, of whom 212, or 73.2 per cent., died or have grown worse; 38, or 13 per cent., improved; and 40, or 13.8 per cent., recovered. Of females, there were 225, of whom 179, or 79.6 per cent., died or have grown worse; 27, or 12 per cent., improved; and 19, or 8.5 per cent., recovered. If,

however, of female patients we include only those between the ages of fifteen and forty years, we find that the dead and hopeless cases amount to 85.3 per cent., with improvement in 9 per cent., and recovery in 6 per cent. Furthermore, I find that the climacteric period furnished a proportionally larger number of female patients, as compared with men of the same age. Of the 67 patients, between the ages of forty and fifty years, the number of females was 41, or 61 per cent., whereas male patients predominate during every other period, except that between ten and twenty years, where females again are in the proportion of 18 to 12, or 68 per cent. This may be coincidence, especially with some cases that were treated at my institution, or at a distance from their home, yet it seems reasonable that the two great epochs, puberty and the climacteric, especially if complications incident to these periods exist, may lead to nutritive disturbances, such as chlorosis and anæmia, and thereby predispose the individual more strongly to infection.

Whereas all the female patients between the ages of ten and twenty years, died or became hopeless cases, the 41 cases, between forty and fifty years, furnish the largest percentage of recoveries, being 10 recoveries, or 25 per cent., against 4 recoveries, or 15.4 per cent., in males of the same age. In 33 of these 41 female patients, menstruation had permanently ceased when they came under my care.

I have frequently noticed that female patients are apt to lose ground during the menstrual week, and this often in the absence of any special disturbance of their menstrual function. Fever if absent is

apt to return, and if fever has been present it is several degrees higher, for a day or two, immediately preceding the menstrual flow. If the period is entirely missed or is delayed the increased temperature has often been observed to continue throughout the time corresponding to the menstrual week. In addition, increased cough, diminished appetite, and digestive disturbances, are frequent, and a loss of several pounds in weight has been noticed in a number of such cases who had been gaining. When such disturbances are repeated monthly they interfere, sometimes quite seriously, with the favorable progress of a case, and must to some extent influence the prognosis.

The occurrence of pregnancy, during any stage of pulmonary tuberculosis, renders the prognosis serious, even in an otherwise favorable case. Of my 225 cases, 13 became pregnant during the earlier stage of the disease; all went to term and were delivered of apparently healthy children; in all active symptoms returned or increased within nine weeks after delivery; in 4 marked temporary improvement again occurred, 12 died, and 1, otherwise a very favorable case, recovered.

It would, therefore, appear that in the female the prognosis is less favorable if her menstrual function be accompanied by the disturbances that are mentioned above, and more favorable if the climacteric period has been passed.

The influence of heredity.—There are few practising physicians who will be convinced by the laboratory student that hereditary influences have nothing to do with the etiology of tuberculosis and

that the acquirement of the disease is accidental. I not only feel absolutely convinced that heredity is an indirect factor in the acquirement of tubercular disease, but it appears also from my records that *the prognosis in such cases is much less favorable.*

No one to-day maintains that heredity means the transmission of the morbid agent which causes the disease. Those who believe that heredity is a factor claim, on clinical grounds, that the subjects of such heredity furnish a larger proportion of cases of pulmonary tuberculosis than those with no inherited tendency, and that had heredity no influence in causing the disease, the number of cases should be the same in those who have and those who have not a consumptive family history.

Among 100 interrogations from patients with phthisis (casually made as I had opportunity and in a locality where phthisis is prevalent) I received 88 negative answers, as to the disease having been present in their respective families. Granting, however, that such a history could be shown in 18 per cent. of the entire population, why is it that more than twice this percentage of tubercular patients show such a history? It is generally accepted that parents transmit physical and often mental peculiarities to their children, why not believe that diseased, weakly and constitutionally depraved individuals should produce weak offspring? We require no predisposition of tissues, only a generally depressed and weak constitution, which causes the organism to be deficient in its nutritive processes, in its force-producing, injury-resisting, and repairing

powers, as compared with individuals who have no such heritage.

Observing physicians believe that such people have little power to resist, and readily become victims to tubercular infection. This would be still more probable if such persons also inherited, or acquired by faulty development, a phthisical thorax, a small heart, a tendency to glandular enlargement, etc., all of which would lead to nutritive disturbances in general and of the lungs in particular. The non-resistance of such persons is only relative. In the cases of acute miliary tuberculosis, or acute phthisis, in which, at least after infection has taken place, non-resistance to the progress of the disease is apparent. In other people the resisting power may be more or less, according to their individuality; all being influenced for the time being by the various conditions of general health, and the intactness of the part in which the infecting germs lodge. I do not believe that any human being possesses an absolute immunity from infection and I have no doubt that if enough of the tubercle bacilli find entrance into the organism, no matter by what avenue, infection will result. The behavior of the infected organism toward the progress of the disease, and in repairing the damage done, may, however, be very different in the constitutionally strong than in those who are predisposed in the sense that I have explained. Speaking for myself as a strong believer in hereditary predisposition, and in a larger sense than the term is generally applied, I would be most unwilling to inhale even the smallest number of

tubercle bacilli, although I am in no sense predisposed to infection.

According to my understanding, the predisposition by heredity need not be the result of phthisical disease of the ancestors, which I have termed *direct hereditary predisposition*. Want of resisting power in the offspring may be the result of a variety of conditions, under which the parents produced a child that easily succumbs to various causes ; but if it lives long enough and if circumstances are favorable, it falls a victim to tubercular infection. This I have termed *indirect hereditary predisposition*.

In my 515 cases the question of heredity was fully answered and recorded 501 times—in 14 cases the patients knew so little of their family history that they could not be satisfactorily classified.

Direct hereditary predisposition (phthisical family history) was shown to have existed 202 times as follows :

From the father's side alone in	51 cases.
From the mother's side alone in	80 "
From both parents in	11 "
From father and grandfather alone in 12	"
From mother and grandmother alone	"
in	20 "
From both parents and both grand- parents in	3 "
From grandfather alone (skipped one generation) in	8 "
From grandmother alone (skipped one generation) in	17 "
Total, 202 cases, or 39.2 per cent. of all.	

As may be seen, the mother and grandmother seemed to transmit a predisposition most frequently.

The possibility of this was present in 131 and is evident in 117 cases, whereas on the part of father and grandfather it was possible in 85 and evident in only 71 cases.

Indirect hereditary predisposition could be shown in 217 cases, or 42.3 per cent., as follows:

(a) Ninety-two cases were children, the sixth or later in large families, often born in rapid succession, none of the older children having acquired the disease; but in 26 cases younger brothers or sisters were also suffering from or had died of phthisis. The history of these patients was almost without exception that they had been less strong and robust than the older children, or had been sick from various causes a great part of their lives.

(b) Twenty-two cases were either one of twins, or the mother had given birth within a year previously to another child. In these cases again, the tubercular patient had nearly always been the weaker one, and delicate from childhood. In two instances the other twin had already died of phthisis.

(c) In 59 cases one or both parents were suffering from impaired general health at the time of conception or during pregnancy—chronic diarrhoea, chronic dyspepsia, cancer, syphilis, disease of the genito-urinary organs, uterine disease, etc. There were also histories of sickness or death of brothers or sisters from meningitis (tubercular?), chronic disease of joints, rickets, spinal disease, scrofula, etc. In 14 cases death in the family from measles and whooping-cough was stated to have occurred, and 28 patients gave a history of scrofula in child-

hood. In 19 cases brothers or sisters were suffering from or had died of phthisis.

(*d*) Forty-four cases gave as part of their histories, that one or both parents were suffering from severe nervous disease previously to the birth of the patient, including insanity, paralysis, locomotor ataxia, and epilepsy. In 9 instances brothers or sisters were or had been suffering from epilepsy or from chorea; in 8, brothers or sisters were suffering or had died from phthisis.

In 78 of these 217 cases the so-called phthisical habitus was noted, although no phthisical history was present, against 136 in the 202 cases in which direct hereditary predisposition was shown.

Considering, now, these 217 cases, their percentage and the circumstances under which the patients were born, is it surprising that such persons have acquired a depraved constitution, or a predisposition to fall more readily victims to disease?

Is it not reasonable to suppose that the minimum amount of infecting material which in such cases would produce phthisis, would be resisted and overcome by stronger persons coming of a better stock?

There remain now 96 cases in which the family history was good, both as to direct and to indirect predisposition, and in which the health was, as a rule, good from infancy. In these we can believe that either they received a sufficiently large dose of infecting material, that such infecting material was of unusual virulency, to which their relative good resisting-power was inadequate, or that they had become temporarily predisposed. In 56 cases the health was said to be good to the time of the

development of phthisis; in 4 the disease followed typhoid fever; in 3 croupous pneumonia; in 8 catarrhal pneumonia; in 5 childbirth; in 1 puerperal fever; in 3 peritonitis; in 1 acute pleurisy; and in 1 measles. The others, as most tubercular patients do, ascribed as a cause "catching cold," by which, perhaps, we should understand "catching tubercular infection."

To show the influence on prognosis of direct, indirect, or no hereditary predisposition, we find from an analysis of my cases that the prognosis does not materially differ, whether direct or indirect predisposition existed. But I was much surprised to find that when hereditary predisposition was absent, six times as many recovered. I have gone over these cases again and again to prove that no error is present; each time with the same result. I then divided the cases into groups according to the years of their occurrence, again with practically the same result.

Table showing the Influence of Heredity upon Prognosis.

	Grouped under.	Number of Cases.	Recov- eries.	Per Cent.
I. Direct hereditary predisposition (family history of phthisis),		202	9	4.5
II. Indirect hereditary predisposition, <i>a</i>		92	6	6.5
" " " <i>b</i>		22	1	4.5
" " " <i>c</i>		59	3	5
" " " <i>d</i>		44	3	7
III. No hereditary predisposition,		96	37	37.6

In view of this extraordinary showing, it is very desirable that other observers consult their records, or make proper inquiry hereafter, and publish their results. This will show whether my results are cor-

rect or incorrect. For such inquiries a systematically arranged series of questions is absolutely necessary. It is essential that the patient should understand that a full statement of the facts, even if it is necessary to make inquiry of friends, has a most important bearing on their individual case.

The influence of the stage of the disease.—Of course the earlier a case, which is susceptible of improvement, comes under proper treatment and management, the better will be the outlook, and no statistical evidence is required to prove this self-evident proposition. Of the 515 cases, 81 were classed as in an early stage and 434 in an advanced stage. Of the 81 early cases, 11 remained under treatment for so short a time that no material change could be expected; 34, or 55.5 per cent., showed improvement and then relapsed, as a rule from causes within their control—all these have since grown hopeless or died; 17 cases, or 21 per cent., are improved, and 20 cases, or 24 per cent., have recovered. Of the 434 advanced cases the disease progressed without material improvement in 125, or 29 per cent.; improvement more or less temporary occurred in 189, or 43.5 per cent.—all relapsed, many from preventable causes, and have grown worse or have died. Marked improvement with prospective arrest of the disease occurred in 33, or $7\frac{1}{2}$ per cent.; all these have relapsed, often from causes within their control, and have grown worse or died; 48, or 11 per cent., of the cases still remain much improved, and 39, or 9 per cent., have recovered. From a scrutiny of these results it is apparent that had an ideal course been pursued in all cases, many more recoveries would

have resulted. The fact is, that such a course was pursued only exceptionally. Taking the improved and recovered cases together we have in the early stage 45 per cent. and in the advanced stages 20 per cent. Of the 515 cases there were three females and one male in whom, although they came under observation early, the disease followed a rapidly fatal course—all deaths occurred within four months. Every effort seemed unavailing to cause even a temporary halt. Aside from the slower course of these cases they differed clinically from acute miliary tuberculosis, in that pulmonary symptoms were more prominent, and the stage of breaking-down and excavation was reached. Physical examination showed the evidence of diffused bronchitis, with many small areas where the respiratory murmur resembled the bronchial. Very little change in the percussion-note was manifest.

In one case the infection could be traced to a cut upon the finger of the left hand, which became inflamed, as did the lymphatics of the arm, and was soon followed by a glandular swelling in the axilla. The general health began to fail after this and before any attention was attracted to the lungs. The patient and her friends, I was told, had obstinately refused to have the swelling incised, though the tubercular character of this was not suspected. The case came to me with this history and a cough, supposed to be bronchitis, which had existed for three months. The slightly-fluctuating, enlarged gland was still noticeable. The patient died ten days later.

Although I could find no source for infection through the blood in the other three cases, I cannot

but believe that it must have existed. They all pursued almost an identical course, and the diffused tubercular deposits with numerous broncho-pneumonic centres throughout both lungs were characteristic of all.

The extent of lung tissue involved in any stage necessarily influences prognosis. Under proper management further involvement of the healthy tissue of other lobes, and especially of the opposite lung, as long as general infection has not occurred, can, as a rule, be prevented. The bacilli having no independent motion must probably be first expectorated to reach with the inspired air healthy parts of the lung, though further infection may also occur by the gravitation of the secretions. For this reason it is important that an already infected case does not inhale more bacilli, and one of the first conditions of proper management is so to take care of the excretions, and especially of the expectoration, that the danger from this source may be reduced to a minimum. The tendency to extensive destructive processes without connective-tissue repair, which determines the formation of cavities, and with the latter an increased liability to severe arterial hæmorrhages, and to long-continued suppuration from the walls, with the attending danger of septic absorption and amyloid degeneration of other organs, influences the prognosis very much. But the mere fact that a cavity exists does not necessarily cloud the prognosis, if the cavity is of moderate size and located favorably. It is then of more importance to determine the presence of still active disease and its extent, and whether the cavity is secreting and enlarging, or is dry with a

tendency to cicatrize and to become obliterated or lined with smooth, fibrous wall. If there is cicatrization the patient has passed through the critical period of softening and suppuration, and he may continue upon a course of uninterrupted improvement. Large cavities in the lower portions of the upper lobe, and those in the lower lobes, or those that for any reason have an imperfect outlet, are apt to remain inflamed, to secrete profusely, and to discharge irregularly. Such cavities frequently continue to enlarge by progressive breaking-down of their walls and to cause exhaustion, particularly if there is much fever.

The influence of the digestive organs.—As long as a fair degree of digestive power and of assimilation of food can be maintained, and if the disease is not hopelessly advanced, we should not despair. On the other hand, it matters little how many encouraging signs we may see in a case; unless we can keep up the nutrition our efforts must ultimately prove fruitless. Many cases acquire gastric and intestinal disturbances by the injudicious use of alcoholics and improper food, and by the use of drugs and patent medicines, especially those which contain opiates. There is also a tendency to sympathetic functional disturbances, especially of the stomach. All such disturbances can, as a rule, be controlled by a proper regimen. If, however structural disease of the digestive organs exists, be it due to the abuse of alcohol, or to long-continued gastric catarrh from other causes; if we have reason to suspect amyloid disease of the vessels of the intestines, of the liver or of the spleen; if we

have fatty liver, or tubercular disease of the biliary passages or of the intestine, we cannot hope to nourish our patient thoroughly. In several cases in which I had the opportunity of seeing the results of autopsies upon patients who had followed the so-called "whiskey cure," I was not surprised at my failure to improve the nutrition. There was atrophy of the gastric glands in one case, with dilatation of the pylorus. In another case the stomach was in a state of severe catarrhal inflammation.

Of functional disturbances none has resisted efforts for permanent relief so obstinately as gastric and intestinal accumulations of gas. In mild cases I have succeeded well enough with diet and the administration of salol; but I have had a number of cases in which all measures failed, and the distress occasioned, as well as the interference with the absorption of food, seemed to hasten materially the downward course of the patients. I could not believe that the gas was due to fermentation, but rather attributed it to non-absorption by the intestinal mucous membrane. Occasional watery stools were also present and some failure of the right side of the heart, with variable increase in the size of the liver. The distress was least after maintaining the recumbent position for a number of hours, causing me to suspect that the abdominal viscera were in a state of passive congestion, which interfered with absorption. In neither of these cases was there any improvement.

Purely functional disturbances of the digestive organs frequently accompany the initial stage of the disease, and simulating dyspepsia they divert the

attention from the real cause. Much time may be lost by treating the dyspepsia alone, and harm may be done by restricting the diet, frequently to artificial food-products, which are poor substitutes at all times. Such conditions if improperly managed cause rapid advance of the lung affection, and require forced feeding with milk, eggs, light meats, and especially with vegetables, in small quantities frequently repeated, to be increased by fats after some improvement has been made. Among medicinal agents creasote, bitter tonics, and wines have seemed beneficial.

There are cases that seem to have no disturbance of their digestive organs and have a good appetite, and yet gain nothing in weight or even continue to lose. Upon inquiry it is found that these cases have daily two to three large evacuations. In such cases if the nutrition is not improved by giving less food and by administering it in frequently repeated, small quantities, the prognosis is unfavorable.

Slight peptonuria, demonstrated by Ehrlich's method, has been noted in a number of cases of recent date, no tests having been made in my earlier cases; profuse and continued peptonuria was found only in rapidly progressing and ultimately fatal cases.

Absolute increase in the amount of urates and uric acid I have frequently seen. It is probably due to diminished oxygenation by obstruction and increased venous tension, diminished respiratory surface, and diminution of red corpuscles. Such patients for the time lost flesh. If this condition could not be relieved by inhalations of oxygen in large quantities,

and if it persisted, it affected the prognosis unfavorably.

The influence of fever, cough, and expectoration.—Fever, cough, and expectoration are common to all cases of pulmonary tuberculosis. It is their intensity and persistency rather than their presence which influence prognosis. In considering them we should also consider the stage of the disease, the previous management, and the deportment of the patient. The fever, in a case under proper management, and when indiscretions of the patient are excluded, pretty clearly reflects by its amount, the activity and extent of pathological processes at the seat of the disease, and reaches, as a rule, its maximum during the stage of softening, absorption, and excavation. If during that period it is moderate, if areas of softening are small and circumscribed, and if we have one lung or a considerable portion of both lungs unaffected, we need not despair. It is a nice question of judgment to estimate the probable duration of this stage. If the patient's nutrition is still fairly good, and if we succeed in preventing serious loss of flesh, or, better still, if he should show a slight gain, we have good reason to believe that the process will remain circumscribed, that tissue-repair will probably take place, or that the cavities will be small and speedily made, and that the patient will pass safely through this stage. After this, improvement will follow. Such has been my experience with the cases I am considering. When large areas are involved, when the temperature rises very high and becomes several degrees subnormal, once, and occasionally twice in twenty four hours, and if the rise

is accompanied with a distinct chill, it is not often that the patient's nutrition can be kept up, and, as a rule, the stage is indefinitely prolonged, and leads to a fatal result. Afebrile periods usually correspond to periods of improvement.

The cough bears a certain relation to the fever, and unless due to non-specific bronchitis is not often troublesome in cases in which the temperature is below 100° F., if over-exertion and fatigue are avoided.

The cases in which the bronchial mucous membrane was extensively involved—the so-called broncho-pneumonias—usually ran their course with higher temperatures, and in these the cough was most severe and exhausting, yielding to nothing short of opiates. The intensity of the cough, its interference with rest, and the effects of opiates on the patient, certainly influenced the prognosis, which appeared, however, always less favorable in the broncho-pneumonic form of the disease. Cough due to catarrhal states of the upper air-passages, or to the symptomatic catarrhal bronchitis, yielded, as a rule, to proper local treatment by inhalations, etc., and did not affect the prognosis.

The quantity and quality of expectoration stand in intimate relation to the stage of the disease. Bloody sputa in the early stage betoken inflammatory changes and extensions; later the sputum comes from ulcerated, inflamed, or congested cavities, especially when the patient has over-exerted himself. The color of the expectorated blood depends upon the time it remained upon the respiratory surfaces; it is, therefore, an aid to diagnosis.

but only indirectly of prognostic significance. Purely purulent sputa is rare in phthisis, and belongs to abscess or empyema. A muco-purulent character is the rule, and it is greatest in quantity during the stage of softening and excavation. Cheesy particles in the sputum come from recent cavities; sand-like or calcareous concretions from old inspissated, purulent, or cheesy deposits, or degenerated bronchial glands. They have no special prognostic significance, except that their presence in the lung is likely to cause suppuration until the particles are expelled.

It has been thought that the number and form of the tubercle bacilli in the expectoration could be made a basis for estimating the intensity of the pathological process and for prognosis. I, too, have endeavored to draw some inferences, but offer my conclusions with some diffidence, and shall be glad to be corrected if I am wrong. It has seemed to me that I am not mistaken. I realize, of course, that the number of bacilli varies greatly, as we select for examination a cheesy particle or one of only muco-pus. To avoid this source of error I have used various expedients which I need not mention in detail, the object being to get a uniform specimen, and I find that I can obtain a pretty equal distribution of the bacilli upon the prepared cover-glasses. If now, repeated examinations showed a steady decrease in the number of the bacilli until finally but a few and occasionally none were found, and especially if the bacilli were very small and thin, and if the peculiar effect in staining, believed to be due to the presence of spores, was absent or but rarely noted, the speci-

men came from a case that was improving in general health, and in the local conditions, in every instance. In cases running an unfavorable or indifferent course no such results were observed.

The influence of the pulse.—Many of my predisposed cases, in fact almost all of them, showed a much increased pulse-rate, as is common in phthisis, even in the absence of fever, and when the latter was present the frequency of the pulse was usually out of proportion to the temperature. A congenitally small heart, which was frequently associated, does not show compensatory hypertrophy when obstruction exists in the lesser circulation, if fever and other nutritive disturbances are present. Even a heart of normal size soon shows the results of such injurious conditions by a less perfectly filled radial artery and a more frequent pulse-rate. The auspicious cases had a comparatively slow pulse, and when fever was absent the pulse-rate approached the normal. This was observed in all my greatly improved and recovered cases.

The influence of concomitant tubercular disease in the upper air-passages.—In 81 cases, in the early stage of phthisis, tubercular laryngitis was present in 5 only. In the 434 advanced cases it was noted 111 times. I propose to make these cases a special study in the future, especially with a view to show the effects of various modes of treatment according to the extent, location, and stage of the lung affection when the disease of the larynx made its appearance. I may say here that in the majority of cases no results were obtainable from treatment as long as the lung disease was progressive, but in 2 cases in an

early stage, and in 10 in an advanced stage, complete cicatrization occurred. These 12 cases still belong to the improved or recovered cases. No case recovered in which the ulcerative and destructive processes were extensive. The epiglottis was seriously involved in 19 cases, none of which recovered. The painful deglutition seriously interfered with nutrition, and the severe paroxysms of cough, too, tended to exhaust the patients, who were nearly all in the last stages. In only 1 case was the pharynx the seat of tubercular disease, and this case also had a small tubercular ulcer of the tongue, with, however, but slight pulmonary deposit; the patient did not improve, but is still alive.

The influence of pulmonary hæmorrhage.—I notice a material difference between the frequency of pulmonary hæmorrhage in my patients in private practice and in those treated in my institution. In the former it occurred in about one-third of all cases; in the latter, in less than one per cent. Besides the anatomical changes which make hæmorrhage possible, over-exertion nearly always preceded it in the cases in private practice and in every case in my institution. In the early stages the hæmorrhage is moderate, results from inflammatory changes, and is simply a diapedesis. In the latter stages moderate hæmorrhage comes from granulating cavities; when severe, it is arterial, and due to the rupture of sacculated or degenerated and still pervious vessels in the cavities. In estimating the effect upon the future course of the disease we must consider the presence or absence of the various other factors which enter into the prognosis. Even a

slight hæmorrhage is at least a temporary hindrance to favorable progress, excluding the exceptional cases in which cough and other symptoms are relieved by the local bleeding of a congested area. But tubercular patients can ill afford the loss of blood even in small quantities. The necessary confinement and the loss of blood itself must certainly, for the time being, check further improvement. If treated by all sorts of mineral and vegetable astringents, ergot, etc., given by the mouth, and if the patient is kept on a diet of ice pills and, perhaps, a few spoonfuls of milk or broth, the loss in nutrition is a further hindrance. Profuse hæmorrhage, especially if repeated, leads to rapid exhaustion, and may terminate a case abruptly by suffocation.

The effect of pleurisy.—Pleurisy, if dry and circumscribed, did not influence the prognosis. Indeed, pleurisy may be conservative by causing thickening and adhesive inflammation over cavities which might otherwise perforate and lead to pneumothorax, a complication which is the beginning of the end. Simple pleurisy, with serous effusion occurred in 5 of my cases, and did not seem to exert any material influence upon the subsequent course of the disease, except that the patients lost flesh and strength during their confinement. Tubercular pleurisy, as a complication, has been recovered from in but 2 of my cases; in these the effusion subsequently became purulent, and required resection of a rib. For a time after the operation the patients improved remarkably, but were then lost from observation, and have since died.

The influence of nasal stenosis.—In 483, or 90

per cent. of cases, catarrhal affections of the nose and throat were present, and there was evidence that they had preceded the lung disease in the great majority of cases. In 221 cases the catarrh was associated with nasal obstruction from turbinated hypertrophies, polypoid growths, septal thickenings, deviations and excrescences that markedly interfered with free respiration through the nose, especially at night; but often during the day also, the patients were obliged to breathe with the mouth open when taking exercise. To what extent these conditions may have favored the deep inhalation of infecting bacilli I cannot here consider, but I am sure that nasal stenosis frequently interfered with improvement, which in many cases occurred only after the obstruction had been removed by proper treatment.

The influence of rectal fistula and peri-rectal abscesses.—Rectal fistula was noted in 27 cases. In 3 cases in the early stage I operated successfully, and 2 of these finally recovered; 24 cases were in an advanced stage of the disease; 1 of these recovered and was subsequently operated on at home. In neither of the other cases was an operation attempted, nor did the fistulæ seem to exert any influence on the disease, though they were an annoyance, frequently became inflamed, and discharged continuously. Small peri-rectal abscesses I have observed more frequently, but have not always kept a record of their occurrence. In all but 4 cases they were immediately incised when discovered, and healed kindly. In the 4 cases in which incision was delayed by the patient neglecting to call atten-

tion to the swelling, fistula resulted. In several of such cases tubercle bacilli were found in the pus.

In conclusion, the personal hygiene and the healthful environments of patients; their steadfastness of purpose and determination; their own proper estimation of the importance of early measures and of implicit compliance with advice; their willingness to make necessary sacrifices, and also the painstaking management of the physician in charge, and his ability to prevent even slight complications, all exert influences which are none the less real or important because their effects are an unknown quantity.

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